REMARKS

Claims presently in the case are 1-11. No claims have been amended, added or cancelled in the present Response.

Obviousness Rejections Under 35 U.S.C. §103(a):

I. Burgmaier et al. in View of Usui et al.

Claims 1-3, 5, 7, 8, 10, and 11 stand rejected under 35 U.S.C. §103(a) as being obvious and unpatentable over Markus Burgmair, Contribution of the Gate Insulator Surface to Work Function Measurements with a Gas Sensitive FET, Proceedings of IEEE Sensors 2002, pp. 439-442 (**Burgmair**) in view of H. Usui et al., Ionization-Assisted Deposition of Alkylacrylate and Fluorinated Alkylacrylate Polymer Thin Films, Proceedings of the 7th International Conference on Properties and Applications of Dielectric Materials, June 1-5, 2003, pp. 104-107 (**Usui et al.**). This rejection is respectfully traversed with regard to the following remarks.

Burgmair discloses a gas sensitive hybrid suspended field-effect transistor that includes: a channel; a suspended silicon gate that is positioned above the gas sensitive film, and which is separated from the channel; and a gate insulator that is fabricated from SiO_2 having a hydrophilic passivation layer of Si_3N_4 applied thereover. See, for example, the Introduction and Figure 2 of Burgmair.

Burgmair describes the observed baseline drift of the sensor as being attributed to "the formation of a thin film of water at the surface of the passivation layer" (i.e., on the Si_3N_4 layer). See the paragraph bridging the first and second columns at page 440 of Burgmair. As such, Burgmair discloses a hydrophilic gate insulator. Burgmair further teaches that the formation of the water film, more particularly, results in the observed baseline drift, because it allows for the transport of charge carriers (i.e., ions). Burgmair teaches that "these transport phenomena induced by the water film" can be prevented by heating the device "to temperatures at which condensation of liquid water at the surface does not occur." See the 5th and 6th full paragraphs in column 1 at page 442 of Burgmair.

Usui et al. disclose the formation of hydrophobic polymeric polyacrylate films by means of ionization-assisted deposition from acrylate sources, such as 1H, 1H, 11H-eicosafluoroundecyl acrylate, onto glass substrates coated with aluminum films. Usui et al. disclose the polyacrylate films formed by ionization-assisted deposition of 1H, 1H, 11H-eicosafluoroundecyl acrylate as having a contact angle of about 94°C (i.e., they are hydrophobic polyacrylate films). See the abstract, the Experimental section, and the 20FAc Films section of Usui et al.

Burgmair discloses a gas sensor that necessarily includes a gate insulator having an **inorganic** **hydrophilic** layer of Si_3N_4 over an underlying substrate of SiO_2. Burgmair provides no disclosure, teaching, or suggestion with regard to a hydrophobic gate insulator or an organic coated hydrophobic gate insulator. Usui et al. disclose the formation of an **organic** **hydrophobic** layer of polymerized 1H, 1H, 11H-eicosafluoroundecyl acrylate over a substrate of aluminum coated glass. In addition, the ionization-assisted deposition as taught by Usui et al. requires an electrically conductive substrate, such as aluminum coated glass. See, for example, Figure 1 of Usui et al. The gate insulator of Burgmair is composed of a substrate of SiO_2 (which is not electrically conductive) having a layer of Si_3N_4 thereover. As such, the method of Usui et al. is not applicable to Burgmair, because a substrate of SiO_2 is not sufficiently electrically conductive for purposes of performing an ionization-assisted deposition process, as would be recognized by a skilled artisan. As such, neither Burgmair nor Usui et al. provide the requisite disclosure that would motivate a skilled artisan to combine or otherwise modify their respective disclosures in an attempt to somehow arrive at Applicants' claimed invention.

The combination of Burgmair and Usui et al. would require the initial deposition of an electrically conductive metal layer over the SiO_2 substrate of Burgmair, thereby converting the gate insulator of Burgmair into an insulated conductor (rather than an insulator), and in effect rendering Burgmair inoperable for its intended purpose, as would be recognized by a skilled artisan.

If proposed modifications render a reference inoperable for its intended purpose, then there is no suggestion or motivation to make the proposed modification, and accordingly the proposed modification would not be obvious. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125

(Fed. Cir. 1984). Similarly, according to the MPEP, the claimed combination of references used to ground an obviousness rejection may not change the principle of operation of the primary reference or render the reference inoperable for its intended purpose. 2145(III); 2143.01.

In light of the preceding remarks, Applicants' claims are believed to be unobvious and patentable over Burgmair in view of Usui et al. Reconsideration and withdrawal of the present rejection are respectfully requested.

II. Burgmair in View of Usui et al. and in Further View of Ruther et al.

Claim 4 stands rejected under 35 U.S.C. §103(a) as being obvious and unpatentable over Burgmair in view of Usui et al., and in further view of P. Ruther et al., Surface Conductivity of a CMOS Silicon Nitride Layer, Proceedings of IEEE Sensors 2003, Vol. 2, pp. 920-925 (**Ruther et al.**). This rejection is respectfully traversed with regard to the following remarks.

Ruther et al. disclose suspended gate field transistor based gas sensors that include passivation layers composed of silicon nitride. Ruther et al. disclose that surface conduction of the silicon nitride is mediated mainly by the temperature dependent adsorption of ambient moisture. As such, the silicon nitride layers of the suspended gate field transistor based gas sensors of Ruther et al. are hydrophilic silicon nitride layers.

Usui et al. disclose the formation of a **organic** **hydrophobic** layer of polymerized 1H, 1H, 11H-eicosafluoroundecyl acrylate applied by ionization-assisted deposition over a substrate of aluminum coated glass. Ruther et al. disclose suspended gate field transistor based gas sensors that include **inorganic** **hydrophilic** passivation layers composed of silicon nitride (e.g., applied over silicon). For the reasons discussed previously herein with regard to a lack of motivation to combine Burgmair and Usui et al., neither Usui et al. nor Ruther et al. provide the requisite disclosure that would motivate a skilled artisan to combine or otherwise modify their respective disclosures in an attempt to arrive at Applicants' presently claimed invention. In addition and for the reasons discussed previously herein with regard to Burgmair and Usui et al., a combination of Usui et al. and Ruther et al. would be similarly inoperable.

A combination of Burgmair and Ruther et al. would result in a gate insulator having an inorganic hydrophilic layer of Si_3N_4 over an underlying substrate of SiO_2. As such, a combination of Burgmair and Ruther et al. would not, as it could not, result in the gas sensor of Applicants' present claims, which includes a gate insulator having a hydrophobic layer thereover.

Burgmair and Usui et al. have been discussed previously herein. Ruther et al. does not serve to overcome or otherwise address the deficiencies of Burgmair and Usui et al., including the lack of motivation to combine Burgmair and Usui et al., or the inoperable result of such combination. As such, a combination of Burgmair, Usui et al. and Ruther et al. would not result in the invention of Applicants' present claims.

In light of the preceding remarks, Applicants' claims are believed to be unobvious and patentable over Burgmair in view of Usui et al., and further in view of Ruther et al. Reconsideration and withdrawal of the present rejection are respectfully requested.

III. Burgmair in View of Usui et al. and in Further View of Yang et al.

Claims 6 and 9 stand rejected under 35 U.S.C. §103(a) as being obvious and unpatentable over Burgmair in view of Usui et al., and in further view of United States Patent No. 6,670,286 B1 (**Yang et al.**). This rejection is respectfully traversed with regard to the following remarks.

Yang et al. disclose a photopolymerization method by which a chemical microsensor film is covalently attached to an oxide surface. The covalently bonded sensing films are formed from hydrophilic materials, such as cyclodextrins, and may be used to detect multiple analytes. See the abstract; column 3, lines 39-50; and column 5, lines 49-53 of Yang et al. Due to the plethora of hydroxyl groups, the films of Yang et al., which are formed from cyclodextrins, would be hydrophilic, as would be recognized by a skilled artisan.

Usui et al. disclose the formation of a polymerized **hydrophobic** layer of 1H, 1H, 11H-eicosafluoroundecyl acrylate formed by ionization-assisted deposition over a substrate of aluminum coated glass. Usui et al. provide no disclosure, teaching, or suggestion with regard to the formation of hydrophilic layers. In addition, the ionization-assisted deposition method as

disclosed by Usui et al. is limited to acrylate monomers, which form polymers by free radical polymerization, as would be recognized by a skilled artisan. Usui et al. provide no disclosure, teaching, or suggestion with regard to the ionization-assisted deposition method being applicable to cyclodextrins, which are not free radically polymerizable, as would be recognized by a skilled artisan. Yang et al. disclose the formation of a **hydrophilic** layer of cyclodextrins over an oxide surface. Yang et al. provide no disclosure, teaching, or suggestion with regard to the formation of hydrophobic layers, or the formation of layers by the *in-situ* free radical polymerization of acrylate monomers deposited on an oxide surface. As such, neither Usui et al. nor Yang et al. provide the requisite disclosure that would motivate a skilled artisan to combine or modify their disclosures so as to arrive at Applicants' claimed invention.

Burgmair discloses a gas sensor that necessarily includes a gate insulator having an **inorganic** hydrophilic layer of Si_3N_4 over an underlying substrate of SiO_2. Burgmair provides no disclosure, teaching, or suggestion with regard to a gate insulator having an organic hydrophilic layer (e.g., formed from cyclodextrins) over an underlying substrate of SiO_2. Yang et al. disclose the formation of an **organic** hydrophilic layer of cyclodextrins over an oxide surface. Yang et al. provide no disclosure, teaching, or suggestion with regard to the formation of an inorganic hydrophilic layer (e.g., of Si_3N_4) over an oxide surface. As such, neither Burgmair nor Yang et al. provide the requisite disclosure that would motivate a skilled artisan to combine or modify their disclosures so as to arrive at Applicants' presently claimed invention. In addition, a combination of Burgmair and Yang et al. would necessarily result in a hydrophilic layer, rather than a hydrophobic layer.

Burgmair and Usui et al. have been discussed previously herein. Yang et al. does not serve to overcome or otherwise address the deficiencies of Burgmair and Usui et al., including the lack of motivation to combine Burgmair and Usui et al., or the inoperable result of such combination. As such, a combination of Burgmair, Usui et al. and Ruther et al. would not result in the invention of Applicants' present claims.

In light of the preceding remarks, Applicants' claims are believed to be unobvious and patentable over Burgmair in view of Usui et al., and further in view of Yang et al. Reconsideration and withdrawal of the present rejections are respectfully requested.

CONCLUSION

In light of the amendments herein and the preceding remarks, Applicants' presently pending claims are believed to define an invention that is unanticipated, unobvious and hence, patentable. Reconsideration of the rejections and allowance of all of the presently pending claims is respectfully requested.

Respectfully submitted,

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